Tikka Tuomas 10 January 2025 Public

Future Raw Materials and Carbon Cycles

Subject Overview

New raw material sources will rely on sustainable carbon cycles

In the future, the chemical industry will require a huge amount of alternative raw material sources, to replace virgin fossil raw materials and energy. Alternative sources include all captured carbon dioxide, recycled/reused carbon (waste), and sustainable bio-based carbon sources. In addition, the chemical industry will need significant amounts of renewable and low-carbon hydrogen. On the inorganic chemistry side, there is a great need to find the best material solutions. A good example is the growing need of batteries and battery chemicals where the recycled materials are the only viable option to subsidy virgin raw materials.

Decreasing the share of virgin fossil raw materials will often reduce the dependence on the imported raw materials and therefore increase material and energy security and resilience. Modern production plants are very efficient and different kind of waste streams, residues and waste heat are utilized effectively. Chemical industry raw materials can also be produced synergistically with other segments. For example, more extensive use of biomass as a raw material in the chemical industry can increase its overall value and benefit food/feed production and renewable energy production.

The chemical industry produces a wide range of products and fuels for other sectors, so finding alternative raw materials is also critical for the carbon neutrality of other industries. Changes in upstream stage of the value chain will impact the entire supply chain and benefit other stages and/or companies too.

New raw material sources have already been identified and deployed. However, the work is challenging. Each new source must be carefully evaluated, and potential limitations and risks assessed. For example, potential raw material might be very climate friendly, but challenging from biodiversity or security perspective.

The incompleteness of legislation and current flaws also slow down the transition and at worst remove the feasibility of investments. In addition, the cost difference between virgin fossil raw material and alternative raw material is often a significant obstacle. As long as the price of the fossil-based raw materials doesn't include the negative environmental impacts, environment-friendly alternatives may struggle to compete economically without incentives.

Background of the legislation

SCC, or Sustainable Carbon Cycles has been the Commission's approach to consolidating various policy areas related to sustainable carbon cycles under one heading. The term itself originates from the Commission's vision, which materialized in a communication paper bearing this name in 2021.

In practice, the Commission's vision focuses significantly on land use and carbon farming but also includes the goal for industries to use 20% non-fossil raw materials, as well as the EU-level

target to capture 5 million tons per year of carbon dioxide from the atmosphere. Following the communication, the Commission presented a proposal for carbon removal certificates, which seems to be primarily aimed at capturing biogenic carbon dioxide and directly capturing carbon dioxide from the atmosphere.

After 2021 SCC communication, the importance of raw materials has grown within the Commission's agenda. By 2024, major initiatives like the Net Zero Industry Act and Critical Raw Materials Act have been implemented. In February 2024, the Commission introduced a communication on industrial carbon usage (ICM) alongside its 2040 climate targets. The ICM communication strongly highlights the role of carbon capture, storage, and utilization in the future as an important part of the 2040 climate framework. Carbon cycles are getting more and more connected into the climate policy.

Sustainable carbon cycles and alternative raw materials are a cross-cutting theme spanning several policy areas. Key legislation includes:

- **Climate:** Emission Trading Directive, CCS Directive, Effort Sharing Regulation, Net Zero Industry Act, carbon removal certifications (including biogenic), Energy Taxation Directive, taxonomy
- **Bio:** Renewable Energy Directive, LULUCF (also relevant to climate policy)
- **Waste:** Waste Framework Directive, Packaging Waste Regulation, Ecodesign for Sustainable Products Regulation (ESPR)
- **Products:** REACH, End of Life Vehicles Regulation, Construction Products Regulation, FuelEU Maritime Regulation, ReFuelEU Aviation
- Critical Raw Materials Act, Green Claims

Objective of the Chemical Industry Federation of Finland:

<u>Key messages</u>

- The EU must develop a sufficient comprehensive Circular Carbon Strategy that covers all alternative carbon cycles (recycled, bio, (B)CCU)
- New market incentives should be developed for products based on alternative carbon sources.
- Existing legislation must be amended to recognize and support alternative carbon sources:
    - Different legislative sectors, such as waste, climate, and product safety regulations must be harmonised to recognise all alternative carbon sources and support carbon cycles
    - Climate legislation must be fixed. The most crucial parts seem to be:
        - ETS including CCU rules and emission accounting rules must be clear and favour fairly (B)CCU products.
        - Terms like "permanent" must be clarified and fixed
        - Hydrogen rules and harmonised sustainability criteria's in Renewable energy directive (RED3) are important and needed
        - Carbon removal certificates should promote alternative carbon cycles fairly

        - Carbon capture related legislation should recognize and cover long lasting chemical industry products like plastics but also short life products fairly.
- Legislation must be harmonized and coherent. One unified "Sustainable Carbon" definition, covering all alternative carbon sources, need to be adopted across all policy areas. Additionally, clear definitions for sustainable products should be defined (ESPR, DPP, taxonomy).
- Funding and subsidies are crucial to accelerate massive investments.
    - Focus should be on EU-level mechanisms instead of subsidy race between EU member states. For example, “Carbon Bank” seems to be promising.
- Only competitive industry can invest and move towards carbon neutrality.

Detailed Messages

All alternative sustainable carbon sources should be favoured over virgin fossil-based raw materials. Legislation should support this principle and obstacles removed. There is a clear need for alternative carbon product markets in EU. Therefore, EU needs to ensure that sufficient comprehensive Circular Carbon Strategy will be prepared. This strategy should support all technologies that are need for circular economy and different carbon loops (chemical and mechanical recycling, (B)CCU technologies, bio-based carbon sources etc). It is also important to remember technology neutrality when promoting alternative carbon sources.

Legislation must support the transition to sustainable circular business models. Well-functioning regulatory framework includes mechanisms such as incentives, obligations, bans, tax steering, subsidies, and pricing externalities such as carbon emissions. Legislation must be also harmonized to equally promote alternative carbon sources. There should be a unified definition for "Sustainable Carbon" that encompasses all alternative carbon sources (bio, recycled, synthetic) and is reflected across all policy areas.

CO2 calculation rules in the emissions trading sector, effort sharing sector and land-use sector are currently inadequate. For example captured carbon or negative emissions are not properly accounted in ETS. In addition, current life cycle modelling calculations are not treating raw material sources fairly. The Commission has identified ETS as one of the key legislations in the future. It is crucial to fix the calculation rules so that technologies related to CCS/U would become more common and new raw material alternatives could become reality. In addition, the role of carbon removal certificates should be clarified. These certificates could be used to connect carbon removals to the ETS, which might solve some challenges related to calculation rules.

Beyond fixing existing legislation, the Commission should focus on developing markets for products which are based on alternative carbon sources. Examining various incentives is particularly important. The following incentives should be considered:

- Binding targets (for states, at the EU level, and/or for companies)
- Product- or product group-specific blending obligations, as well as obligations related to material use
- Bans and restrictions
- Support mechanisms (eur/t of alternative raw material)
- Tax incentives (lower tax rates for alternative products)

Too strict technology guidance is not needed. However, in certain situations, it is justified to promote certain new technologies or environmentally friendly products. For example, the double counting for the advanced biofuels category is justified to push advanced fuels into wider use.

The legislative framework should favour the development of a hydrogen economy including green hydrogen, low carbon hydrogen and other climate friendly possibilities. By-product hydrogen should be acceptable and comparable to renewable hydrogen. Sufficient flexibility must be maintained in the use of weather-dependent renewable energy for RFNBO (green hydrogen). Moreover, it is crucial to ensure energy cost competitiveness of the industry, security of supply, and sufficient availability of electricity and energy.

It is important that the sustainability criteria's for renewable fuels are kept unchanged to maintain the operational capability of current and planned investments. Long-term and predictable politics are essential for industrial investments. Sustainability criteria could be harmonized to cover other bio-based products too. This would require simultaneous arrangements to ensure incentives for new alternative carbon products.

Funds and subsidies will be in crucial role when pushing massive investments forward. Since industrial investment projects are typically huge and different project stages like engineering and construction phases are very long, the support schemes must allow long implementation periods. There must also be political will to support a concrete business case for sustainability. EU-level innovation-, investment- and maybe even product subsidies are important as long as the new production methods are more expensive when compared to existing virgin fossil products.

It is also essential to maintain access for all EU member countries to funding mechanisms and avoid unfair national funding competition among member states. For example, a "carbon bank" type of EU-fund could be justified from this perspective. New market incentives are also needed to support demand for products made from sustainable alternative raw materials.
Incentives must be legally binding EU-level regulations or economic indicators because softer targets wont usually lead to sufficiently successful changes.

Examples of regulatory measures to create incentives for chemical industry products which are based on sustainable alternative raw materials:

- Setting mandatory targets for sustainable, non-fossil raw materials in the chemical industry by sector.
- Setting mandatory targets for sustainable, non-fossil carbon in intermediates under the Ecodesign of Sustainable Products Regulation (ESPR).
- Setting mandatory targets for sustainable, non-fossil carbon in final products under ESPR and other sector-specific legislation.
- Including municipal waste incineration in the EU Emissions Trading System (EU ETS).
- Setting a carbon fee on the use of fossil-based carbon in the production of chemicals and plastics or in final products.
- Setting binding targets for carbon removals in products.
- Ensuring that binding EU-level legislation is aligned with each other (e.g., ESPR and the EU Taxonomy).

Additionally, the use of sustainable alternative raw materials can be incentivized with the following types of EU-level economic measures:

- Payments from EU member states to the EU budget based on fossil carbon consumption in materials.
- Reduced tax rates for products made from sustainable alternative raw materials.

For small member states like Finland, it is important to abandon flexible state aid rule exceptions which implemented during the pandemic years. Funding should be based on fair EU-wide state aid rules and criteria's.

Only a competitive industry can survive the raw material revolution challenge and successfully adapt it's processes to future demands. More information can be found from the other CIFF position papers.